PHYSICS ABSTRACTS

BEING

SCIENCE ABSTRACTS—SECTION A

VOL. 45

1942

ERSITY LIBRARY

EDITED AND ISSUED BY

THE INSTITUTION OF ELECTRICAL ENGINEERS

SAVOY PLACE, VICTORIA EMBANKMENT, LONDON, W.C.2

IN ASSOCIATION WITH

THE PHYSICAL SOCIETY

THE AMERICAN PHYSICAL SOCIETY

THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

U OF I
LIBRARY

CONTENTS

		Page
List of Journals		iii
List of Abstractors		vii
Abstracts:		
51	Mathematics	1, 41, 77, 109, 129, 153, 177, 201, 221, 249, 273, 293
52	Astronomy	1, 42, 77, 110, 129, 153, 177, 201, 222, 250, 274, 293
53	Physics. General	2, 43, 79, 112, 133, 155, 179, 201, 225, 250, 277, 295
531	Mechanics	3, 43, 79, 113, 133, 155, 179, 202, 225, 251, 278, 295
532	Liquids	3, 44, 80, 114, 134, 156, 179, 203, 226, 251, 278, 296
532.5	Hydrodynamics	4, 44, 80, 114, 134, 156, 180, 203, 226, 251, 278, 297
532.6	Surface tension	5, 45, 114, 135, 157, 180, 204, 226, 251, 279, 297
532.7	Osmosis. Solutions	6, 46, 80, 114, 135, 157, 180, 204, 227, 251, 279, 298
533	Gases	6, 46, 81, 115, 136, 180, 205, 227, 252, 298
533.6	Aerodynamics	6, 81, 115, 158, 181, 205, 227, 280
533.7	Kinetic theory	81, 115, 136, 158, 181, 205
534	Sound. Vibrations	7, 47, 81, 115, 136, 158, 181, 205, 227, 252, 280, 298
535	Optics	9, 48, 82, 116, 137, 158, 181, 206, 228, 253, 281, 300
536	Heat. Thermodynamics	14, 52, 86, 118, 139, 161, 184, 208, 231, 255, 283, 302
537	Electricity	17, 54, 87, 120, 141, 163, 185, 210, 233, 258, 284, 303
537.531	X-rays	18, 56, 88, 120, 142, 164, 185, 234, 260, 303
538	Magnetism. Electromagnetism	20, 56, 92, 121, 143, 166, 188, 211, 236, 261, 285, 304
539	Molecular and atomic physics	20, 57, 94, 122, 143, 166, 188, 212, 236, 262, 285, 304
539.16	Radioactivity	21, 58, 95, 122, 143, 167, 189, 212, 237, 262, 306
539.3	Elasticity. Strength	24, 61, 97, 123, 145, 169, 190, 214, 239, 264, 287, 307
541	Physical chemistry	26, 63, 99, 124, 145, 170, 192, 216, 240, 265, 288, 308
542	Practical chemistry	35, 72, 101, 126, 151, 173, 198, 220, 245, 271, 290
548	Crystallography	35, 72, 102, 127, 151, 173, 198, 246, 271, 290, 312
55	Geophysics	37, 73, 102, 127, 152, 175, 198, 220, 247, 271, 291, 312
551.5	Meteorology	38, 74, 106, 128, 152, 175, 199, 220, 247, 272, 291, 312
57	Biology	220, 272
58	Botany	176
595.7	Entomology	220
61	Medical sciences	152, 176, 200, 220, 248, 292
62	Engineering	200, 220, 272
63	Agriculture	220, 292
66	Industrial chemistry	152, 220, 248, 272, 292, 312
669	Metallurgy	176, 200, 248, 292, 312
67	Various industries	220, 248, 272, 312
681.4	Optical instruments	272
77	Photography	108, 152, 176, 200, 220, 248, 272, 292, 312
788	Musical instruments	312
9	History	200, 272
Author Index		313
Subject Index		361

ERRATA

Yearly Author Index 1941, p. 404, col. 2, line 38: *for* Beckert, K., *read* Bechert, K.

Abstr. 332, *for* 583.7, *read* 551.583.7

,, 1500, *for* 535.230.8, *read* 535.23.08

,, 1572, line 2: *for* Meyer-Epple, *read* Meyer-Eppler.

,, 1755, line 1: *for* Nissau, *read* Nissan.

,, 2398, line 2: *for* Bull., *read* Repr.

,, 2877, line 6: *for* construction, *read* conduction.

ADDENDUM

Abstr. 320, line 1: *insert* Cullinane, H., as author.

,, 948, line 1: *insert* Gray, R. W., as author.

33
Sec. A
Vol. 45-46
1-2968
C

LIST OF JOURNALS

* Denotes a Journal from which only articles on Physics are abstracted.

Abbreviations	*Full title and address*
Akust. Z.	Akustische Zeitschrift. S. Hirzel, Königstrasse 2, Leipzig, C.1, Germany.
*Amer. Inst. Min. Metallurg. Engrs, Techn. Publ.	American Institute of Mining and Metallurgical Engineers, Technical Publications. The Secretary, 29 West 39th Street, New York.
Amer. J. Phys.	American Journal of Physics. The American Institute of Physics, 175 Fifth Avenue, New York.
*Amer. J. Roentgenol. and Radium Ther.	American Journal of Roentgenology and Radium Therapy. Charles C. Thomas, 220 East Monroe Street, Springfield, Illinois, U.S.A.
*Amer. J. Sci.	American Journal of Science. New Haven, Connecticut, U.S.A.
Ann. Astrophys. Obs. Smithson. Instn	Annals of the Astrophysical Observatory of the Smithsonian Institution. Washington, D.C.
Ann. Harv. Coll. Obs.	Annals of the Harvard College Observatory. Cambridge, Mass., U.S.A.
Ann. Phys., Lpz.	Annalen der Physik. J. A. Barth, Salomonstrasse 18b, Leipzig, C.1, Germany.
*Ann. Rev. Petrol. Technol.	Annual Review of Petroleum Technology. C/o Imperial College of Science and Technology, South Kensington, S.W.7.
Ann. Solar Phys. Obs.	Annals of the Solar Physics Observatory, Cambridge. The Cambridge University Press, Bentley House, Euston Road, London, N.W.1.
*Arch. Elektrotechn.	Archiv für Elektrotechnik. J. Springer, Linkstrasse 22–24, Berlin, W.9.
*Arch Sci. Phys. Nat.	Archives des Sciences Physiques et Naturelles. Institut de Physique de l'Université, Geneva, Switzerland.
*Arch. techn. Messen	Archiv für technisches Messen. R. Oldenbourg, Schliessfach 31, Münich 1, Germany.
*Ark. Kemi Min. Geol.	Arkiv för Kemi, Mineralogi och Geologie. Almqvist och Wiksells Boktryckeri-A.B., Stockholm; and H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.C.1.
Ark. Mat. Astr. Fys.	Arkiv för Matematik, Astronomi och Fysik. Almqvist och Wiksells Boktryckeri-A.B., Stockholm; and H. K. Lewis & Co., Ltd., 136 Gower Street, London, W.C.1.
Astrophys. J.	Astrophysical Journal. The University of Chicago Press, 5750 Ellis Avenue, Chicago, Illinois, U.S.A.
*Brit. J. Radiol.	British Journal of Radiology. The British Institute of Radiology, 32 Welbeck Street, London, W.1.
Bull. Calcutta Math. Soc.	Bulletin of the Calcutta Mathematical Society. The Secretary, 92 Upper Circular Road, Calcutta, India; and Bowes & Bowes, 1 Trinity Street, Cambridge, England.
*Bull. Chem. Soc. Japan	Bulletin of the Chemical Society of Japan. Faculty of Science, Imperial University of Tokyo, Japan.
Bull. Earthq. Res. Inst., Tokyo	Bulletin of the Earthquake Research Institute. Tokyo Imperial University, Komaba, Tokyo.
Bull. Harv. Coll. Obs.	Bulletin of the Harvard College Observatory. The Observatory, Cambridge, Mass., U.S.A.
Bull. Lick. Obs.	Bulletin of the Lick Observatory. University of California, Berkeley, California, U.S.A.
*Bull. Math. Biophys.	Bulletin of Mathematical Biophysics. University of Chicago Press, 5750 Ellis Avenue, Chicago, Illinois, U.S.A.
Bull. Seism. Soc. Amer.	Bulletin of the Seismological Society of America. The University of California Press, Berkeley, California. U.S.A.
*Bull. Univ. Ill. Engng Exp. Sta.	Bulletin of the University of Illinois Engineering Experiment Station. University of Illinois, Urbana, Illinois, U.S.A.
*Bull. U.S. Bur. Min.	Bulletin of the Bureau of Mines. Superintendent of Documents, Government Printing Office, Washington, D.C.
*Canad. J. Res.	Canadian Journal of Research. National Research Council of Canada, Ottawa.
*Carnegie Instn Yearb.	Carnegie Institution Yearbook. The Carnegie Institution of Washington, Washington, D.C.
Circ. Harv. Coll. Obs.	Circular of the Harvard College Observatory. The Observatory, Cambridge, Mass., U.S.A.
Circ. Un. Obs., Johannesb.	Circular of the Union Observatory of South Africa. Johannesburg, South Africa.
*Circ. Univ. Ill. Engng Exp. Sta.	Circulars of the University of Illinois Engineering Experiment Station. University of Illinois, Urbana, Illinois, U.S.A.
*Circ. U.S. Bur. Stand.	Circular of the National Bureau of Standards. Superintendent of Documents, Government Printing Office, Washington, D.C.
*Climatol. Data, W. Indies	Climatological Data. U.S. Department of Commerce, Weather Bureau, Washington, D.C., U.S.A.
Colo. Sch. Min. Quart.	Colorado School of Mines Quarterly. Golden, Colorado, U.S.A.
*Curr. Sci.	Current Science. B. N. Sastri, Indian Institute of Science, Hebbal P.O., Bangalore, India.
*Econ. Pap. U.S. Bur. Min.	Economic Papers of the Bureau of Mines. U.S. Department of Commerce, Superintendent of Documents, Government Printing Office, Washington, D.C.
*Econ. Proc. Roy. Dublin Soc.	Economic Proceedings of the Royal Dublin Society. Ballsbridge, Dublin; and Williams & Norgate, 36 Great Russell Street, London, W.C.1.

Abbreviations	*Full title and address*
*Electrotechnics	Electrotechnics. Journal of the Electrical Engineering Society. Indian Institute of Science, Bangalore, India.
*Engineer, Lond.	Engineer. 28 Essex Street, Strand, London, W.C.2.
*Engineering	Engineering. 18 and 20 Compton Road, Hayes, Middlesex, England.
*Engng Exp. Sta., Univ. Minnesota, Techn. Pap.	Engineering Experiment Station Technical Papers. University of Minnesota Institute of Technology, Minneapolis, U.S.A.
*Engng Exp. Sta. News, Ohio State Univ.	Engineering Experiment Station News, Ohio State University, Columbus, Ohio, U.S.A.
*Forsch. IngWes.	Forschung auf dem Gebiete des Ingenieurwesens. Ausgabe B. VDI-Verlag, G.m.b.H., Dorotheenstrasse 40, Berlin, N.W.7.
*Gemmologist	Gemmologist. N.A.G. Press Ltd., 226 Latymer Court, London, W.6.
*Geol. Mag., Lond.	The Geological Magazine. Stephen Austin & Sons, Ltd., Fore Street, Hertford, England.
*Handb. U.S. Bur. Stand.	Handbook of the National Bureau of Standards. Superintendent of Documents, Government Printing Office, Washington, D.C.
Helv. Phys. Acta	Helvetica Physica Acta. E. Birkhäuser et Cie, Bâle, Switzerland.
*Illum. Engng, N.Y.	Illuminating Engineering. Mt. Royal and Guilford Avenues, Baltimore, Maryland, U.S.A.
Indian J. Phys.	Indian Journal of Physics and Proceedings of the Indian Association for the Cultivation of Science. 210 Bowbazar Street, Calcutta, India.
*Industr. Engng Chem.	Industrial and Engineering Chemistry. C. L. Parsons, 1155 16th St., N.W., Washington, D.C.
*Industr. Engng Chem. (Analyt. Edit.)	Industrial and Engineering Chemistry (Analytical Edition). C. L. Parsons, 1155 16th St., N.W., Washington, D.C.
J. Acoust. Soc. Amer.	Journal of the Acoustical Society of America. The American Institute of Physics, 175 Fifth Avenue, New York.
*J. Aero. Sci.	Journal of Aeronautical Sciences. 20th and Northampton Streets, Easton, Pa., U.S.A.
*J. Amer. Chem. Soc.	Journal of the American Chemical Society. Publication Office, 20th and Northampton Streets, Easton, Pa., U.S.A.
*J. Amer. Concr. Inst.	Journal of the American Concrete Institute, 7400 Second Boulevard, Detroit, Michigan, U.S.A.
*J. Appl. Mech.	Journal of Applied Mechanics. The American Society of Mechanical Engineers, 29 West 39th Street, New York.
J. Appl. Phys.	Journal of Applied Physics. The American Institute of Physics, 175 Fifth Avenue, New York.
J. Chem. Phys.	Journal of Chemical Physics. The American Institute of Physics, 175 Fifth Avenue, New York.
J. Chem. Soc.	Journal of the Chemical Society. Burlington House, London, W.1.
J. Fac. Sci. Tokyo Univ.	Journal of the Faculty of Science of Tokyo Imperial University. Maruzen Co. Ltd., Tokyo.
*J. Franklin Inst.	Journal of the Franklin Institute of the State of Pennsylvania, Prince and Lemon Streets, Lancaster; and Benjamin Franklin Parkway, Twentieth Street, Philadelphia, Pa., U.S.A.
*J. Indian Inst. Sci.	Journal of the Indian Institute of Science. The Hosali Press, 6 Ulsoor Road, Bangalore, India.
*J. Inst. Fuel	Journal of the Institute of Fuel. 30 Bramham Gardens, London, S.W.5.
*J. Inst. Petrol.	Journal of the Institute of Petroleum. C/o Imperial College of Science and Technology, South Kensington, London, S.W.7.
*J. Instn Auto Engrs	Journal of the Institution of Automobile Engineers. 12 Hobart Place, London, S.W.1.
*J. Instn Civ. Engrs	Journal of the Institution of Civil Engineers. Great George Street, London, S.W.1.
*J. Math. Phys.	Journal of Mathematics and Physics. The Managing Editor, Massachusetts Institute of Technology, Cambridge, Mass., U.S.A.
*J. Mysore Univ.	Journal of the Mysore University. Bangalore Press, Mysore Road, Bangalore City, India.
J. Opt. Soc. Amer.	Journal of the Optical Society of America. The American Institute of Physics, 175 Fifth Avenue, New York.
J. Phys. Chem.	Journal of Physical Chemistry. Williams & Wilkins Co., Mt. Royal and Guilford Avenues, Baltimore, Maryland, U.S.A.; and Baillière, Tindall & Cox, 8 Henrietta Street, Covent Garden, London, W.C.2.
J. Phys., U.S.S.R.	Journal of Physics. Academy of Sciences of the U.S.S.R., Kuznetski Most 18, Moscow; and Collett's Bookshop Ltd., 66 Charing Cross Road, London, W.C.2.
*J. Proc. Instn Mech. Engrs, Lond.	Journal and Proceedings of the Institution of Mechanical Engineers. Storey's Gate, St. James's Park, London, S.W.1.
J. Res. Nat. Bur. Stand., Wash.	Journal of Research of the National Bureau of Standards. Superintendent of Documents, Government Printing Office, Washington, D.C.
J. Roy. Astr. Soc. Can.	Journal of the Royal Astronomical Society of Canada. 198 College Street, Toronto, Canada.
*J. Roy. Soc. Arts	Journal of the Royal Society of Arts. G. Bell & Sons, Ltd., York House, Portugal Street, London, W.C.2.
*J. Roy. Techn. Coll. Glasg.	Journal of the Royal Technical College, Glasgow. Robert Anderson & Sons, 142 West Nile Street, Glasgow, C.1.
J. Sci. Instrum.	Journal of Scientific Instruments. Institute of Physics, The University, Reading, Berks., England.
*J. Soc. Glass Technol.	Journal of the Society of Glass Technology. "Elmfield," Northumberland Road, Sheffield 10, England.
*J. Soc. Dy. Col., Bradford	Journal of the Society of Dyers and Colourists. 32–34 Piccadilly, Bradford, England.

Abbreviations	*Full title and address*
*J. Text. Inst.	Journal of the Textile Institute. St. Mary's Parsonage, Manchester.
J. Univ. Bombay	Journal of the University of Bombay. Bombay, India.
*J. Wash. Acad. Sci.	Journal of the Washington Academy of Sciences. 450 Ahnaip Street, Menasha, Wis., U.S.A.
Jap. J. Math.	Japanese Journal of Mathematics. The Secretary, National Research Council, Imperial Academy House, Ueno Park, Tokyo.
Jap. J. Phys.	Japanese Journal of Physics. The Secretary, National Research Council, Imperial Academy House, Ueno Park, Tokyo.
*Kolloid-Beih.	Kolloid-Beihefte. Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany.
*Kolloid Z.	Kolloid Zeitschrift. Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany.
*Light and Ltg	Light and Lighting. The Illuminating Engineering Society, 32 Victoria Street, London, S.W.1.
*Mech. Engng, N.Y.	Mechanical Engineering. The American Society of Mechanical Engineers, 29 West 39th Street, New York.
*Mem. India Met. Dep.	Memoirs of the India Meteorological Department. The Manager of Publications. The India Meteorological Department, Simla, India.
*Mem. Manchr Lit. Phil. Soc.	Memoirs and Proceedings of the Manchester Literary and Philosophical Society. 36 George Street, Manchester, England.
Met. Z.	Meteorologische Zeitschrift. F. Vieweg und Sohn A.G., Vor der Burg 18, Braunschweig, Germany.
*Min. Mag.	Mines Magazine. 734 Cooper Building, Denver, Colorado, U.S.A.
*Misc. Publ. U.S. Bur. Stand.	Miscellaneous Publications of the National Bureau of Standards. U.S. Department of Commerce, Superintendent of Documents, Government Printing Office, Washington, D.C.
Mon. Not. Geophys. Suppl. Roy. Astr. Soc.	Monthly Notices, Geophysical Supplement of the Royal Astronomical Society. Burlington House, London, W.1.
Mon. Not. Roy. Astr. Soc.	Monthly Notices of the Royal Astronomical Society. Burlington House, London, W.1.
Mon. Weath. Rev., Wash.	Monthly Weather Review. Superintendent of Documents, Government Printing Office, Washington, D.C.
*Nat. Geogr. Soc. Contrib. Techn. Pap., Solar Eclipse Series	National Geographic Society Contributed Technical Papers, Solar Eclipse Series. National Geographic Society. Geographic Administration Buildings, Sixteenth and M Streets Northwest, Washington, D.C., U.S.A.
*Nature, Lond.	Nature. Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2.
*Naturwissenschaften	Naturwissenschaften. J. Springer, Linkstrasse 22–24, Berlin, W.9.
Nova Acta Regiae Soc. Sci. Upsal.	Nova Acta Regiae Societatis Scientiarum Upsaliensis. Upsala, Sweden.
Observatory	Observatory. Taylor & Francis, Red Lion Court, Fleet Street, London, E.C.4.
*Pap. Phys. Oceanogr. Met.	Papers in Physical Oceanography and Meteorology. The Massachusetts Institute of Technology and Woods Hole Oceanographic Institution, Cambridge and Woods Hole, Mass., U.S.A.
Phil. Mag.	The London, Edinburgh and Dublin Philosophical Magazine and Journal of Science. Taylor & Francis, Red Lion Court, Fleet Street, London, E.C.4.
Phil. Trans.	Philosophical Transactions of the Royal Society of London. Cambridge University Press, Bentley House, Euston Road, London, N.W.1.
*Photogr. J.	Photographic Journal. The General Editor, The Royal Photographic Society, 16 Princes Gate, London, S.W.7.
Phys. in regelmäss. Ber.	Die Physik in regelmässigen Berichten. J. A. Barth, Salomonstrasse 18b, Leipzig, C.1, Germany.
Phys. Rev.	The Physical Review. The American Institute of Physics, 175 Fifth Avenue, New York.
Phys. Z.	Physikalische Zeitschrift. S. Hirzel, Königstrasse 2, Leipzig, C.1, Germany.
*Pop. Astr.	Popular Astronomy. Carleton College, Northfield, Minnesota, U.S.A.
*Proc. Amer. Acad. Arts Sci.	Proceedings of the American Academy of Arts and Sciences. 28 Newbury Street, Boston, Mass., U.S.A.
*Proc. Amer. Phil. Soc.	Proceedings of the American Philosophical Society. Independence Square, Philadelphia, Pa., U.S.A.
Proc. Camb. Phil. Soc.	Proceedings of the Cambridge Philosophical Society. Cambridge University Press, Bentley House, Euston Road, London, N.W.1.
Proc. Indian Acad. Sci.	Proceedings of the Indian Academy of Sciences. Hebbal, Bangalore, India.
*Proc. Leeds Phil. Lit. Soc.	Proceedings of the Leeds Philosophical and Literary Society. Prof. R. Whiddington, The University, Leeds, England.
*Proc. Nat. Acad. Sci., Wash.	Proceedings of the National Academy of Sciences. The Home Secretary, The National Academy of Sciences, Constitution Avenue and 21st St., Washington, D.C.
*Proc. Nat. Inst. Sci. India	Proceedings of the National Institute of Sciences of India. 1 Park Street, Calcutta, India.
Proc. Phys.-Math. Soc., Japan	Proceedings of the Physico-Mathematical Society of Japan. Faculty of Science, Tokyo Imperial University, Tokyo.
Proc. Phys. Soc., Lond.	Proceedings of the Physical Society. 1 Lowther Gardens, Exhibition Road, London, S.W.7.
*Proc. Roy. Instn	Proceedings of the Royal Institution of Great Britain. 21 Albemarle Street, London, W.1.

44819

Abbreviations	*Full title and address*
* Proc. Roy. Irish Acad.	Proceedings of the Royal Irish Academy. Hodges, Figgis & Co., Dublin; and Williams & Norgate, 36 Great Russell Street, London, W.C.1.
Proc. Roy. Soc.	Proceedings of the Royal Society of London. Cambridge University Press, Bentley House, Euston Road, London, N.W.1.
*Proc. Roy. Soc. Edinb.	Proceedings of the Royal Society of Edinburgh. Oliver & Boyd, Tweeddale Court, Edinburgh; and 98 Great Russell Street, London, W.C.1.
*Proc. Roy. Soc. Vict.	Proceedings of the Royal Society of Victoria. Victoria Street, Melbourne, C.1, Australia.
*Proc. Univ. Durham Phil. Soc.	Proceedings of the University of Durham Philosophical Society. E. Patterson, Asst. Librarian, King's College, Newcastle upon Tyne, England.
*Publ. Dep. Sci. Industr. Res.	Publications of the Department of Scientific and Industrial Research, H.M. Stationery Office, York House, Kingsway, London, W.C.2.
Publ. Dom. Astrophys. Obs. Vict., B.C.	Publications of the Dominion Astrophysical Observatory, Victoria. Victoria, B.C., Canada.
Publ. Dom. Obs. Ottawa	Publications of the Dominion Observatory, Ottawa. Department of Mines and Resources, Ottawa.
*Publ. Fac. Cienc. Fís.-Mat. La Plata	Publicaciones de la Facultad de Ciencias Físico-Matemáticas de la Universidad Nacional de la Plata. La Plata, Argentine.
Quart. J. Roy. Met. Soc.	Quarterly Journal of the Royal Meteorological Society. 49 Cromwell Road, South Kensington, London, S.W.7.
*Radiography	Radiography. Journal of the Society of Radiographers, 32 Welbeck Street, London, W.1.
*Radiology	Radiology. The Secretary-Treasurer, The Radiological Society, 607 Medical Arts Building, Syracuse, N.Y., U.S.A.
*Rep. Aero. Res. Inst. Tokyo	Report of the Aeronautical Research Institute. Tokyo Imperial University, Komaba, Tokyo.
*Rep. Brit. Elect. Allied Industr. Res. Assoc.	Reports of the British Electrical and Allied Industries Research Association. 15 Savoy Street, London, W.C.2.
*Rep. Off. Dig. Fed. Paint Varn. Prod. Cl.	Report of the Official Digest of the Federation of Paint and Varnish Production Clubs. Hilo Varnish Corporation, 42 Stewart Avenue, Brooklyn, New York.
Rep. Phys. Soc. Progr. Phys.	Reports on Progress in Physics. The Physical Society, 1 Lowther Gardens, Exhibition Road, London, S.W.7.
*Repr. Univ. Ill. Engng Exp. Sta.	Reprint Series of the University of Illinois Engineering Experiment Station. University of Illinois, Urbana, Illinois, U.S.A.
*Res. Rep. Brit. Non.-Ferr. Met. Res. Assoc.	Research Reports of the British Non-Ferrous Metals Research Association. Euston Street, London, N.W.1.
Rev. Mod. Phys.	Reviews of Modern Physics. The American Institute of Physics, 175 Fifth Avenue, New York.
Rev. Sci. Instrum.	Review of Scientific Instruments. The American Institute of Physics, 175 Fifth Avenue, New York.
Rev. Univ. Nac. Tucumán	Revista de la Universidad Nacional de Tucumán, Tucumán, Argentine.
*Sch. Sci. Rev.	School Science Review. John Murray, Albemarle Street, London, W.1.
*Schweiz. Arch. angew. Wiss. Techn.	Schweizer Archiv für angewandte Wissenschaft und Technik. Buchdruckerei Vogt-Schild A.G., Solothurn, Switzerland.
*Schweiz. Bauztg	Schweizerische Bauzeitung. Verlag C. and J. Jegher, Dianastrasse 5, Postcheck VIII 6110, Zürich, Switzerland.
*Sci. and Cult.	Science and Culture. University College of Science, 92 Upper Circular Road, Calcutta, India.
Sci. Notes India Met. Dep.	Scientific Notes of the India Meteorological Department. The Manager of Publications, The India Meteorological Department, Simla, India.
*Sci. Pap. Inst. Phys. Chem. Res., Tokyo	Scientific Papers of the Institute of Physical and Chemical Research. Komagome, Hongo, Tokyo.
Sci. Proc. Roy. Dublin Soc.	Scientific Proceedings of the Royal Dublin Society. Ballsbridge, Dublin; and Williams & Norgate, 36 Great Russell Street, London, W.C.1.
*Science	Science. The Science Press, Lancaster, Pa., U.S.A.
Spec. Publ. U.S. Cst Geod. Surv.	Special Publications of the Coast and Geodetic Survey. U.S. Department of Commerce, Government Printing Office, Washington, D.C.
*Techn. Pap. U.S. Bur. Min.	Technical Papers of the Bureau of Mines. U.S. Department of Commerce, Superintendent of Documents, Government Printing Office, Washington, D.C.
Terr. Magn. Atmos. Elect.	Terrestrial Magnetism and Atmospheric Electricity. The Johns Hopkins Press, Baltimore, Maryland, U.S.A.
Trans. Amer. Geophys. Un.	Transactions of the American Geophysical Union. 5241 Broad Branch Road Northwest, Washington, D.C.
*Trans. Electrochem. Soc.	Transactions of the Electrochemical Society. Columbia University, New York.
Trans Faraday Soc.	Transactions of the Faraday Society. Gurney & Jackson, 98 Great Russell Street, London, W.C.1
*Trans. Illum. Engng Soc., Lond.	Transactions of the Illuminating Engineering Society. 32 Victoria Street, London, S.W.1.
*Trans. Instn Engrs Shipb. Scot.	Transactions of the Institution of Engineers and Shipbuilders in Scotland. Elmbank Crescent, Glasgow, Scotland.
*Trans. Instn Nav. Archit., Lond.	Transactions of the Institution of Naval Architects. 10 Upper Belgrave Street, London, S.W.1.

Abbreviations	*Full title and address*
*Trans. N.-E. Cst Instn Engrs Shipb.	Transactions of the North-East Coast Institution of Engineers and Shipbuilders. Bolbec Hall, Newcastle upon Tyne, England.
*Trans. Roy. Soc. Can.	Transactions of the Royal Society of Canada. Ottawa.
*Trans. Roy. Soc. Edinb.	Transactions of the Royal Society of Edinburgh. Oliver & Boyd, Tweeddale Court, Edinburgh; and 98 Great Russell Street, London, W.C.1.
*Univ. Pa., Delaware Notes	University of Pennsylvania, Delaware Notes. University of Pennsylvania, Philadelphia, Pa., U.S.A.
VDI [Z. Ver. dtsch. Ing].	Zeitschrift des Vereines deutscher Ingenieure. VDI-Verlag, G.m.b.H., Dorotheenstrasse 40, Berlin, N.W.7.
*Z. angew. Math. Mech.	Zeitschrift für angewandte Mathematik und Mechanik. VDI-Verlag, G.m.b.H., Dorotheenstrasse 40, Berlin, N.W.7.
Z. Astrophys.	Zeitschrift für Astrophysik. J. Springer, Linkstrasse 22–24, Berlin, W.9.
*Z. Elektrochem.	Zeitschrift für Elektrochemie und angewandte physikalische Chemie. Verlag Chemie, G.m.b.H., Corneliusstrasse 3, Berlin, W.35.
Z. Kristallogr.	Zeitschrift für Kristallographie, Kristallgeometrie, Kristallphysik, Kristallchemie. Akademische Verlagsgesellschaft m.b.H., Sternwartenstrasse 8, Leipzig, C.1, Germany.
*Z. Metallk.	Zeitschrift für Metallkunde. VDI-Verlag, G.m.b.H., Dorotheenstrasse 40, Berlin, N.W.7.
Z. Phys.	Zeitschrift für Physik. J. Springer, Linkstrasse 22–24, Berlin, W.9.
Z. phys. Chem.	Zeitschrift für physikalische Chemie (Abteilungen A und B). Akademische Verlagsgesellschaft m.b.H., Sternwartenstrasse 8, Leipzig, C.1, Germany.
*Z. techn. Phys.	Zeitschrift für technische Physik. J. A. Barth, Salomonstrasse 18b, Leipzig, C.1, Germany.

ABSTRACTORS

G. E. Allan, D.Sc. C. B. Allsopp, M.A., Ph.D. W. R. Angus, M.A., B.Sc., Ph.D. N. F. Astbury, M.A., F.Inst.P. G. O. Baines, M.A., Ph.D., A.Inst.P. E. H. W. Banner, M.Sc., M.I.E.E., F.Inst.P. F. S. Barton, M.A., B.Sc., F.Inst.P., A.M.I.E.E. G. E. Bell, M.Sc., Ph.D., A.Inst.P. W. G. Bickley, D.Sc. P. H. Bigg, B.Sc. N. M. Bligh, A.R.C.S., A.I.C. F. J. Brislee, D.Sc., F.I.C. L. G. Carpenter, B.A., B.Sc. T. A. Chalmers, B.Sc., Ph.D. F. C. Champion, M.A., Ph.D. J. S. Clark, B.Sc., A.R.C.S., D.I.C. K. M. Constable, B.A., B.Sc. R. Davis, M.Sc. G. H. Dieke. E. H. Dock, M.Sc., A.R.C.S., D.I.C., A.Inst.P. W. E. Duncanson, M.Sc., Ph.D. L. Essen, B.Sc. J. Ewles, M.A. F. T. Farmer, B.Sc.(Eng.), Ph.D. R. C. Fox, Ph.D, B.Sc.(Eng.), A.M.I.E.E. L. E. Furtmüller, Ph.D. A. E. M. Geddes, M.A., D.Sc. W. H. George, M.Sc., Ph.D., F.Inst.P. R. H. Golde, A.M.A.I.E.E. G. Greenwood, M.Sc., A.Inst.P. S. J. Gregg, Ph.D., A.R.C.S. G. P. Harnwell. H. H. Harrison, M.Eng., M.I.E.E. L. Hartshorn, D.Sc., A.R.C.S., D.I.C. A. Harvey, Ph.D., B.Sc., F.Inst.P. A. von Hippel. H. H. Hodgson, Ph.D., M.A., B.Sc. D. R. Hudson, B.Sc. A. Hunter, Ph.D., D.I.C., F.R.A.S. J. Iball, D.Sc., Ph.D., F.Inst.P. T. I. Jones, M.Sc., Ph.D., A.R.C.S. J. Kaye, B.Sc. L. Kellner, Ph.D. J. E. Keyston, B.Sc., Ph.D. B. J. Leggett, M.R.C.S. A. J. McConnell, D.Sc., F.T.C.D. G. C. McVittie, M.A., Ph.D., F.R.A.S. A. S. D. Maunder, F.R.A.S. A. J. Mee, M.A, B.Sc. A. C. Menzies, M.A., D.Sc. R. Mines, B.Sc.(Eng.). R. E. Neale, B.Sc., A.C.G.I., A.M.I.E.E. R. Neumann, B.Sc. O. Oldenberg. R. Peierls, M.A., Ph.D., D.Sc. R. W. Powell, B.Sc., Ph.D. R. S. Read, M.A., B.Sc. W. A. Richardson, B.A., D.Sc., B.Sc.(Eng.). J. E. Roberts, Ph.D. E. Rushton, B.Sc. M. G. Say, Ph.D., M.Sc., M.I.E.E. D. Shoenberg, Ph.D. H. G. Solomon, A.C.G.I., M.I.E.E. H. J. H. Starks, Ph.D., A.Inst.P. W. S. Stiles, Ph.D., D.Sc. E. O. Taylor, B.Sc., A.M.I.E.E. J. Thewlis, D.Sc. A. M. Thomas, B.Sc., F.Inst.P., A.M.I.E.E. J. S. G. Thomas, D.Sc. A. E. Tooke, B.Sc., A.M.I.E.E., A.Inst.P. M. S. Vallarta. J. W. T. Walsh, M.A., D.Sc., M.I.E.E. W. H. Ward, B.Eng. W. W. Watson. C. E. Webb, B.Sc., A.C.G.I., D.I.C., A.M.I.E.E. J. J. Weigle. S. Weintroub, M.A., A.Inst.P. A. C. Whiffin, B.Sc., M.Sc.(Eng.). E. E. Widdowson, M.Sc., Ph.D., A.Inst.P. A. Wilkinson, B.Sc. A. P. Wilmshurst, A.C.G.I., A.M.I.E.E. A. B. Wood, D.Sc. W. D. Wright, D.Sc., A.R.C.S., D.I.C.

Editor:

J. A. Wilcken, B.Sc., Ph.D.